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ABSTRACT

This paper investigates the reasons why teachers change school districts by examining teacher characteristics and school districts as predictors of district change. The data set traces the careers of Michigan public school teachers during the 1970s. The study is restricted to districts with stable or expanding enrollments to ensure that the job changes are voluntary and not driven by layoffs. The regression models used are built on a discrete-time maximum likelihood method. Results show that a teacher's probability of changing districts increases during the first two years of teaching, then steadily decreases. Also, older teachers move less than younger ones, men move less than women, and blacks change districts more than whites. Teachers in special education and departmentalized secondary school subjects appeared to have more opportunities for job changes than other teachers. Perhaps the most important findings pertain to district characteristics as predictors. These variables suggest areas where policymakers can focus their efforts to keep schools adequately supplied with teachers as future enrollments increase. Teachers are more likely to leave districts that are small, have large numbers of low socioeconomic status (SES) students, or provide low annual salary increments. There is evidence that high annual salary increments can be used to retain teachers in low SES districts. Included are 13 endnotes.
(Author/MLH)

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A STUDY OF TEACHERS' INTERDISTRICT JOB CHANGES

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Annual Meeting Of The

American Educational Research Association

April 9, 1988

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ABSTRACT

The purpose of this paper is to investigate the reasons why teachers change school districts. We examine characteristics of teachers and school districts as predictors of district change. Our dataset traces the careers of Michigan public school teachers during the 1970s. We have restricted our study to districts with stable to expanding enrollments to ensure that the job changes are voluntary, and not driven by layoffs. To build our regression models, we use a discrete-time maximum likelihood method, which is particulary appropriate for analyzing longitudinal data.

Our results show that a teacher's probability of a district change increases during the first two years of teaching, then steadily decreases. With respect to demographics, we found that older teachers move less than younger ones, men move more than women, and Blacks change districts more than Whites. Teachers in some subject areas appeared to have more opportunities for job changes than other teachers. This was found to be the case for teachers of departmentalized secondary school subjects compared to elementary school teachers. Those who were in special education had a much higher district change probability than all other teachers, which may have been the result of increased Federal funding in this area during the early to mid-1970s.

Perhaps our most important findings pertain to district characteristics as predictors. These variables suggest areas where policy makers can focus their efforts to ensure that all schools are adequately supplied with teachers as future enrollments increase. We have found that teachers are more likely to leave districts that are small, have large numbers of low-SES students, or provide low annual salary increments. There is evidence that high annual salary increments can be used to retain teachers in low-SES districts.

A STUDY OF TEACHERS' INTERDISTRICT JOB CHANGES

During the past several years, enrollment levels have been increasing in school districts across the United States. As this growth continues and teachers' job opportunities improve, superintendents are concerned about their ability to retain the faculty they have. Our purpose is to explore characteristics of teachers and school districts to find out which ones are important in determining whether teachers will leave a school district and move to another one.

I. FOCUS

We focus on interdistrict job changes for several reasons. First, if we were to look at job changes within districts, we could not examine the importance of financial incentives since districts in the United States typically have the same salary scale for all schools. Second, much of the movement within large cities that has been the focus of previous studies would be involuntary because of the many layoffs and "bumping" that occurred during the 1970's, which is the period covered by our dataset. A third reason for this focus is that our dataset contains much better information on student socioeconomic status at the district level than at the school level, and we believe that this variable merits close examination.

A number of prior studies have been done on teacher job changes, with the theoretical perspective coming from human capital theory. As part of this theory, it is assumed that workers become less likely to change jobs as they acquire skills that are specific to a particular workplace. For example,

teachers should be less inclined to leave a district once they learn how to deal effectively with the principal, students, and parents at the schools where they work. A second assumption is that workers will leave firms that do not pay well or have adverse working conditions. Thus teachers could leave one district for higher-paying jobs in another district, or to get students who are easier to teach. This theory, plus evidence from prior studies, has led us to focus on the following research questions:

1. As teachers gain experience, do they also become less likely to change districts?
2. Do teachers' demographic characteristics, grade levels or subject areas affect the probability of a district change?
3. Can district characteristics such as enrollment level, socioeconomic status (SES), or salary scales affect interdistrict mobility?/1/

We are particularly interested in the last question, since it focuses on potential incentives that policy makers can adjust to affect teachers' decisions to change districts.

II. THE DATASET

The dataset for this study was recently compiled as part of a research project headed by Richard J. Murnane.[2] The information comes from the Michigan State Department of Education and from a special tabulation of United States Census data on Michigan public school districts commissioned by the National Center for Education Statistics.[3] Three cohorts of teachers are included in the study: those who began teaching during the 1972-73, 1973-74, and 1974-75 school years. None of the personnel in the dataset had teaching experience prior to their year of entry

into the Michigan public school system. The cohorts are pooled to ensure that the dataset is sufficiently large for categories with small cell sizes to be analyzed. Teacher race is one such variable, since there were not many Black teachers in the districts we examined.

The dataset has three strengths that make it particularly appropriate for this study. First, teachers' job movements can be followed over a seven-year period. This, along with the methodology we use, enables us to examine the length of time that teachers typically remain in the same district. The approach is better than that of past studies, which look only at the probability of a job change and not at the length of time teachers are likely to remain in the same job. This time element is important since it is no doubt a key concern of superintendents and other policy makers.

A second strength of the dataset is that it contains information needed to pursue the three research questions listed in Section I, including measures of teacher demographics, grade level, subject area, and district characteristics. A third strength of the dataset is its large size, which enables us to examine subgroups of particular interest. In this paper we focus on all fulltime public school teachers from Michigan districts with stable to expanding enrollment levels during the seven-year period covered by the study. We define "stable to expanding" as an average annual enrollment change greater than -1.5 percent. This is done to distinguish voluntary from involuntary job changes, since past studies of teacher mobility

have shown this to be an important distinction.[4] We assume that district changes made by the "declining enrollment" group are more often involuntary than for teachers in the "stable to expanding" group. Declining enrollments would result in layoffs and subsequent district changes by teachers who would not move if they did not have to do so.

In Table 1 on page 5 we list the means and standard deviations of variables used in this study for districts with stable to expanding enrollments and districts that have declining enrollment levels. The figures show some dramatic differences between the two groups. On the whole, the declining districts are much more urbanized, as shown by a mean enrollment level more than five times the size of the stable-to-expanding districts. With greater urbanization comes a lower median income, more residents living below the poverty level, a higher percentage of Black teachers (and presumably Black students), and more teachers in special education.[5] It should be added that when teachers from the Detroit school district are removed from the "declining enrollment" group, the differences decline to some extent, but are still substantial.

Our analysis, then, focuses on teachers from suburban and rural districts in Michigan. This raises a question as to whether the results would be the same if the dataset were more representative of the entire state. Two variables, district enrollment level and starting salary, have a much smaller standard deviation in the stable-to-expanding districts than in districts with declining enrollments. This suggests that these

(continued on page 7)

Table 1

Means (with Standard Deviations in Parentheses) of Variables Used in the Discrete-Time Models to Analyze Interdistrict Job Changes of Michigan Public School Teachers

Variable/a	Stable to Expanding	Declining
Dependent Variable		
Teacher changed districts	0.09 (0.28)	0.09 (0.29)
Teacher Demographic Characteristics		
Age at entry	24.70 (5.00)	25.31 (5.71)
Teacher is female	0.64 (0.48)	0.68 (0.47)
Teacher is Black	0.01 (0.11)	0.09 (0.29)
Level Taught		
Junior high school	0.19 (0.39)	0.20 (0.40)
Senior high school/b	0.29 (0.46)	0.30 (0.46)
Subject Area Taught		
Secondary school subjects/c	0.50 (0.50)	0.53 (0.50)
Special education	0.06 (0.24)	0.11 (0.32)
District Socioeconomic Status		
Median family income (000s)/d	36.34 (8.02)	31.81 (8.15)
% workers in professional jobs	23.40 (7.70)	25.01 (8.24)
% below poverty line/e	7.26 (4.16)	10.64 (6.43)
Median adult yrs. of ed.	12.18 (0.37)	12.18 (0.52)
Other District Characteristics		
Enrollment level (000s)	4.90 (4.85)	25.55 (62.88)
Starting salary (00s)	202.65 (12.91)	184.74 (27.13)
Annual salary increase (00s)	10.83 (2.47)	8.41 (2.34)
Salary increase from master's degree (00s)	27.72 (10.83)	30.16 (13.40)

a. Variables are not listed if they represent omitted baseline categories. These include males for gender, Whites for race, and elementary for both level and subject area.

Table 1 (continued)

b. This variable includes senior high school teachers, plus a small number listed as teaching at the junior and senior high school levels.

c. High school subjects include English, physical and life sciences, mathematics, social sciences, foreign languages, vocational education, business, and physical education.

d. All salary and income figures are in 1986 dollars.

e. This variable represents the percentage of children under 18 living below the poverty line. All socioeconomic status variables come from the 1980 U. S. census. Although these teachers started in the early 1970's, we used the 1980 tabulations because they had a more complete listing of districts than the 1970 dataset. All other teacher variables come from the Michigan State Department of education and reflect each teacher's first year of teaching.

variables would have smaller standard errors if we were looking at the entire state at a time when all districts had stable to expanding enrollment levels. As discussed in Section IV, our results show that enrollment level is an important predictor of whether or not teachers change districts, but starting salaries are not.

III. METHODOLOGY

To estimate models of teachers' interdistrict job movements, we use a discrete-time maximum likelihood method, which is particularly appropriate for analyzing longitudinal data. One important advantage that this method has over ordinary least squares regression is that it can deal more effectively with "censored" observations. Censoring can occur when an individual is no longer at risk of the event of interest. In our study, this happens when teachers leave the Michigan public school system. These teachers are of no further interest to our study because after leaving they are not at risk of changing districts. Censoring also takes place when teachers remain in the same district throughout the study's time frame. Beyond this period, it is not known what happens to these teachers because the data do not cover their entire careers. With the discrete-time method, full use is made of the information contained in censored observations since each case is included in the model estimate as long as it is at risk of experiencing an event of interest. By contrast, the use of ordinary least squares regression would lead to adjustments that could bias the results, such as eliminating all censored observations or giving them arbitrary values.

Another important advantage of the discrete-time method is that it permits the modelling of predictor variables over time. In this study, teacher salary and district enrollment level are treated as time-varying. These variables were chosen because they are likely to change over time, and such changes could have a dramatic impact on teachers' decisions to move. For salaries, first year values could be inadequate measures of monetary incentives since district payscales are not likely to change uniformly over time. The modelling of district enrollment over time serves as another means of controlling for this variable, which we have already tried to do by restricting the study to teachers who start out in stable to expanding districts.

In our regression models, the dependent variable is the probability that a teacher changed districts in a given year. From these models we can estimate these probabilities, given the values of different predictors such as teacher demographics, grade level, subject area, and district characteristics. In addition, we include dummy variables for year of teaching to show how the probability of a district change varies over time.[6]

IV. RESULTS

All of our results come from the discrete-time regression equations discussed in Section 3. These equations enable us to discuss the districts that teachers move <u>from</u>, but we cannot talk about teachers' destination districts without further analysis.

We report our results in two different ways. First, a

series of estimated models, with coefficients and standard errors, is shown in Table 2 on pages 11-13. The variables Year 2, Year 3, etc. indicate the particular years in which each teacher was teaching, and are used to measure the importance of time as a predictor. Years 3-5 are represented by one variable because we could not reject the null hypothesis that the predicted probability of a district change for these years is different from that of the first year of teaching. Variables are collapsed in this way to decrease the number of estimated parameters in the model. This, for example, was done for subject area, which was reduced from 12 to three categories.

A second way in which we report our results is shown in Table 3 on page 15, which gives what we call "district change probabilities" indicating the likelihood that teachers will change districts during the first seven years of teaching. These probabilities are estimated from the models shown in Table 2.

Our results are given in terms of the answers they provide to each of the three research questions listed in Section I.[7]

A. Question 1: As teachers gain experience, do they become less likely to change districts?

Based on the "year of teaching" coefficients displayed in Model I of Table 2, the probability of changing districts increases from the first to the second year of teaching, after which this probability decreases with experience. A possible explanation for the initial increase is that districts value teaching experience, so that the personnel who have taught for two years have more opportunities for job changes than teachers

with less experience. The decline that occurs after two years would support human capital theory, which holds that workers are less likely to change jobs as they acquire skills that are specific to a particular work place.[8]

B. Question 2: Do teachers' demographic characteristics, grade levels, or subject areas affect the probability of a district change?

1. Entry Age

Since the dataset only includes personnel who began in Michigan with no prior teaching experience, it is possible to measure teacher entry age as a predictor, with years of experience held constant. Table 3 illustrates the negative relationship we found between entry age and probability of changing districts. The figures show that a teacher entering at age 22 has a district change probability that is about .06 greater than for a teacher who enters at age 42.

2. Teacher Gender

In Table 3 the district change probability for females is lower than that of males by .06. However, it is not clear from this result why women change districts less than men. In their study of teacher mobility in Great Britain, Zabalza et al. found that males were more responsive to financial incentives than females, which is a possibility that we are currently investigating.[9]

(continued on page 14)

Table 2

Discrete-time Hazard Models Produced from the Final Data Analysis, Full-time Michigan Public School Teachers Starting in School Years 1972-73, 1973-74, And 1974-75 (N = 3,427)

Variable/a	(1)	(2)	(3)
Intercept	-.517 (.794)	.180 (1.196)	-.592 (1.380)
Year of Teaching			
Year 2	.472* (.223)	.427~ (.219)	.393~ (.216)
Years 3-5	.009 (.190)	.057 (.183)	-.106 (.177)
Year 6	-.409~ (.228)	-.482* (.214)	-.523* (.204)
Year 7	-.700** (.222)	-.744*** (.208)	-.770*** (.197)
Teacher Demographic Characteristics			
Age at entry	-.051** (.017)	-.052** (.017)	-.052** (.017)
Female	-.425*** (.108)	-.427*** (.108)	-.430*** (.108)
Black/b	1.964** (.679)	2.106** (.697)	2.034** (.685)
Cohort Year			
1973-74 or 1974-75	-.435*** (.119)	-.461*** (.116)	-.465*** (.115)
Level Taught			
Junior high school	-.497* (.200)	-.504* (.199)	-.515** (.197)
Senior high school	-.376~ (.206)	-.374~ (.207)	-.371~ (.207)

Table 2 (continued)

Variable	(1)	(2)	(3)
Interaction Terms			
Female by junior high school	1.630** (.506)	1.653** (.509)	1.637** (.507)
Senior high school by cohort '73-74, '74-75	.595~ (.324)	.604~ (.325)	.594~ (.324)
Subject Area Taught			
Secondary school subjects/c	.747** (.266)	.763** (.268)	.726** (.265)
Special education	3.586*** (.469)	3.724*** (.477)	3.678*** (.473)
District Characteristics			
Enrollment level (000s)	-.109*** (.031)		
Socioeconomic status/d	-.006 (.005)	-.013* (.005)	
Starting salary (00s)	-.012 (.012)	-.016 (.013)	-.021~ (.012)
Annual salary increase (00s)	-.031 (.090)	-.138~ (.081)	-.223*** (.066)
Salary increase from master's degree (00s)	-.001 (.018)	-.017 (.018)	-.024 (.018)

a. Each coefficient, b, has been transformed by taking (exp(b) - 1), so that it indicates the percentage change in the probability of a district change for every unit change in the predictor. For example, the age variable in the first model has a coefficient of -.051, which means that the predicted probability decreases by 5.1 percent for each additional year of age. The interpretation is similar for categorical variables, except that the omitted category is the point of reference. For example, the variable "Black" in the first model has a coefficient of 1.964, which means that the predicted probability of district change for Black teachers is about 1.96 times the size of the predicted White probability.

Table 2 (continued)

Omitted categories include Year 1 (for year of teaching), Males (gender), Whites (race), 1972-73 (cohort year), and elementary (level taught and subject area).

The numbers in parentheses, which are derived from the original standard errors, have the same proportional relationship to the transformed coefficients as the original standard errors have to the raw coefficients. P-values are represented as follows:

~ = $p < .10$;
* = $p < .05$;
** = $p < .01$;
*** = $p < .001$.

b. It should be noted that there are only 44 Blacks in this dataset, which represents teachers from districts with stable to expanding enrollment levels in the 1970s. The p-values for the "Black" variable would probably be lower if the cell size was larger.

c. Secondary school subjects include English, physical and life sciences, mathematics, social sciences, foreign languages, vocational education, business, and physical education.

d. This is a composite of four socioeconomic status measures listed in Table 1: median income, median educational attainment of the adult population, percent of adult labor force in professional positions, and percent of children under 18 living below the Federal poverty line.

3. Teacher Race

Our results show a district change probability for Black teachers that is .15 higher than that of Whites. One possible explanation is provided by Antos and Rosen, who found that teachers seem to prefer working with students of their own respective races.[10] If this were the case, the Black teachers in our dataset should be moving to districts, or at least to schools, with higher percentages of Black students than their own schools or districts. In future work, we intend to investigate this possibility.

4. Grade Level and Subject Area

For the most part, we find that teachers at the junior and senior high school levels are less likely to change districts than elementary school teachers. An exception occurs with females at the junior high school level who have a relatively high district change probability.

For subject area, the results are much different. It was found that teachers of secondary school subjects have a district change probability that is .06 greater than for those who teach a general elementary curriculum. We also found that special education teachers are far more likely than anyone else to change districts; for example, their district change probability is .25 greater than that of elementary teachers. During the 1970s there were probably significant shortages of special education teachers since increased Federal funding must have created a greater demand for these personnel. We believe that the relatively high

(continued on page 17)

Table 3

Predicted Probabilities of Changing Districts Over A Seven-Year Period For Michigan Public School Teachers Entering Teaching In 1972-73, 1973-74, or 1974-75

Variable /a	7-Year Move Prob.	Variable	7-Year Move Prob.
Teacher Characteristics		**District Characteristics**	
AGE AT ENTRY:		ENROLLMENT LEVEL: /b	
22	.094	1,377	.114
32	.057	9,883	.045
42	.034		
		SES: /c	
GENDER:		31.7	.108
Female	.090	69.8	.068
Male	.150		
		ANNUAL SALARY INCREASE: /d	
RACE:		$ 766	.116
White	.090	$1,368	.067
Black	.240		
		ANNUAL SALARY INCREASE, LOW-SES DISTRICT: /e	
LEVEL TAUGHT:		$ 766	.125
Elementary	.090	$1,368	.090
Junior high	.046		
Senior high	.057		
INTERACTION TERM:			
Female - jr. high	.116		
SUBJECT AREA:			
Elementary	.090		
Secondary	.150		
Special Ed.	.342		

a. Unless otherwise indicated, these estimates come from Model 1 in Table 2. In order to examine the importance of a variable as a predictor, all other variables in the equation are held constant. For continuous variables, these constant values are their medians: 3,631 for district enrollment, 23 for age at entry, $18,450 for starting salary, $1,031 for annual salary increment, $2,409 for master's degree increment, and 49.8 for the SES composite variable. Constant values for categorical variables include female for gender, White for race, and elementary for both grade level and subject area.

Table 3 (continued)

b. For district characteristics the values represent the tenth and ninetieth percentiles of each variable.

c. This estimate comes from Table 2, Model 2. For the SES composite variable, at the tenth (and ninetieth) percentiles the values are $29,314 ($46,554) for income, 12.97 (3.02) for percent below poverty, 12.06 (12.38) for educational attainment, and 12.19 (35.02) for percent professional.

d. This estimate comes from Table 2, Model 3.

e. This estimate comes from Table 2, Model 2.

district change probability for teachers at the elementary level (in contrast to the elementary subject area) is caused by the presence of special education teachers in the elementary grades.

C. Can district characteristics such as district size, socioeconomic status (SES), or salary scales affect interdistrict mobility?

Our analysis of district characteristics is complicated by correlations found among the three variables of interest: enrollment level, socioeconomic status, and salaries, all of which are positively correlated with each other.[11] Since our study focuses on suburban and rural districts, we believe that the correlations reflect differences between two types of districts: 1) rural areas that are small, low in socioeconomic status, and pay low salaries, and 2) suburban districts that are larger, high in socioeconomic status, and pay relatively high salaries. While all districts in our study do not fit these two categories, we believe that enough districts do to get the moderate levels of correlation that we found.

Of these three variables, enrollment level was found to be the most important predictor, followed by SES and salaries. To illustrate the effect of each variable, we have included three models in Table 2: Model 1 with all variables of interest, Model 2 with enrollment level removed, and Model 3 where we took out the enrollment and SES variables. Model 2, then, can be used to examine SES without the effect of enrollment, while we can look at salary variables in Model 3 without the effects of enrollment and SES.

1. District Enrollment Level

Teachers may move away from smaller districts since they would tend to have fewer job opportunities than larger districts. Our findings support this scenario, with Model 1 showing a negative coefficient for the district enrollment variable. The figures in Table 3 indicate that teachers from districts with enrollment levels in the tenth percentile (1,377) have a district change probability that is about .07 greater than for teachers from districts in the ninetieth percentile (9,883).

2. Socioeconomic Status

To measure the socioeconomic status of district residents, we created a composite index from the following census variables: median family income, percent of children living below the poverty line, percentage of the labor force working in professional positions, and the median years of formal education for the adult population. This index has a range of 1 to 100.[12]

In Model 2 the coefficient for the SES variable is negative, which means that teachers are more likely to leave low-SES districts. We find that teachers from districts in the tenth percentile of SES level have a probability of changing districts that is .04 greater than teachers from districts at the ninetieth percentile.

While we know that teachers are more inclined to move out of low-SES districts, we have not yet investigated the extent to which they actually move into districts with higher SES levels.

3. Salary Scales

We believe that in assessing their situations, teachers will not only look at how much money they are currently making, but also at what they can expect to make in the future. To accommodate these expectations in our models, we included three salary variables measuring starting salaries, average annual increments, and raises that teachers get after earning master's degrees. These variables represent compensation schedules for each district and are modelled over time so that they reflect any changes brought about by negotiated wage agreements. To correct for inflation, all values are expressed in 1986 dollars.[13]

Our results suggest that a teacher's starting salary and the raise received from a master's degree have little effect on teachers' district changes; however, the annual salary increment is important. In Model 2, where the enrollment variable has been removed, the salary increment variable is a fairly good predictor of district change, although it still has a high standard error term. In Model 3, where the SES variable has also been removed, the salary increment variable is a much better predictor, with a higher coefficient and lower standard error. The coefficient is negative, which means that the lower the salary increment, the more likely a teacher is to leave a district. In Table 3, predicted district change probabilities from Model 3 indicate that teachers whose annual increments are at the tenth percentile ($766) have a probability of changing districts that is .05 greater than for teachers whose increments are at the ninetieth

percentile ($1,368).

Using Model 2, where we have controlled for SES levels, we find that teachers in low-SES districts who average $766 in annual salary increments have a predicted district change probability that is .034 greater than for teachers getting $1,368. This result suggests that to some extent teachers can be retained in low-SES districts with adequate financial incentives.

V. CONCLUSION

In a number of key respects, our findings shed light on the nature of teachers' interdistrict job changes. For example, we have found that a teacher's probability of a district change increases during the first two years of teaching, then steadily decreases. With respect to demographics, we found that older teachers move less than younger ones, men move more than women, and Blacks change districts more than Whites.

Teachers in some subject areas appear to have more opportunities for job changes than other teachers. For example, teachers of secondary school subjects such as English, mathematics and science are more likely to change districts than those who teach a general elementary curriculum. In addition, special education teachers had a much higher district change probability than all other teachers, which may have been the result of increased Federal funding in this area during the early to mid-1970s.

Perhaps our most important findings pertain to district characteristics as predictors. These results suggest areas where policy makers can focus their efforts to ensure that all schools

are adequately supplied with teachers as future enrollments increase. We have found, for example, that teachers are more likely to leave districts that are small, have large numbers of low-SES students, or provide low annual salary increments. District size is a particularly strong predictor.

There is some evidence that high annual salary increments can be used to retain teachers in all districts, including those with low-SES levels. Although the effect appears to be modest, this raises the question of whether financial incentives could be used to prevent within-district moves away from low-SES schools, as opposed to the between-district job changes that we have examined. If this were the case, the effect could be greater than we have reported because teachers' job changes are much more frequent within districts than between them--about two-and-a-half times more frequent in our dataset. We believe that this question is worth pursuing, although it is beyond the scope of our study because there are usually no financial incentives to change jobs within districts due to uniform salary scales among schools.

Notes

1. Human capital theory is discussed in David Greenberg and John McCall, "Teacher Mobility and Allocation," The Journal of Human Resources, Vol. 9, No. 4, Fall 1974, pp. 481-482; and Gary Becker, Human Capital, (New York: National Bureau of Economic Research, 1964), pp. 1-15, 19-20. In addition to the Greenberg and McCall study, the most important prior works on teacher job mobility are Howard S. Becker, "The Career of the Chicago Public Schoolteacher," The American Journal of Sociology, Vol. 57, 1952; William H. Baugh and Joe A. Stone, Mobility and Wage Equilibration in the Educator Labor Market," Economics of Education Review, Vol. 2, No. 3, Summer 1982; and Richard J. Murnane, "Teacher Mobility Revisited," The Journal of Human Resources, Vol. 16, No. 1,

Winter 1981.

2. The project was funded by the National Science Foundation under grant number SPA-8554462.

3. The Michigan Department of Education provided raw data tapes from records kept on all public school teachers, schools, and school districts in the State. Census data for Michigan school districts came from the following source: "1980 Census of Population and Housing, Process and Products: Public Elementary and Secondary School systems," (National Center for Education Statistics, February 1983).

4. Richard J. Murnane, op. cit., pp. 8-9, Randall W. Eberts, "Determinants of Teacher Turnover during the 1970s: The Case of New York State Public School Teachers, Final Report--Paper III," (National Institute of Education, Washington DC, December 1982), p. 14.

5. There is evidence that children from families with low socioeconomic status are more likely be assigned to special education classes. See Judith D. Singer and John A. Butler, "The Education for All Handicapped Children Act: Schools as Agents of Social Reform," Harvard Educational Review, Vol. 5, No. 2 (May 1987), p. 145.

6. We use logistic regression to estimate the discrete-time models. In the dataset, a separate observation is created for each year that a teacher is teaching. The procedure can be illustrated with a simple model containing two explanatory variables: x1, which is constant over time, and x2(t), which has a different value at each time t. In our study, x1 might be teacher gender, while x2 could be teacher salary. The dependent variable would be the hazard rate h(t). The logit transformation of the hazard rate would be log(h(t)/(1 - h(t)), which in this study represents the log odds of a teacher changing districts. This hazard rate can vary by letting the intercept, a, be different at each point in discrete time. The resulting equation can be written as follows:

$$\log(h(t)/(1 - h(t)) = a(t) + b1x1 + b2x2(t)$$

where a(t) refers to a set of constants, one for each year covered by the dataset. For a more complete discussion of this method, see Paul D. Allison, Event History Analysis, (Beverly Hills: Sage Publications, 1984), pp. 14-22.

7. It is necessary to say something about the cohort effect that was found in the analysis. In our models we include a dummy variable indicating whether the teacher is in the two later cohorts, as opposed to the earliest one. The coefficient for this variable is both large and negative, which probably results from the steady enrollment decline that occurred in Michigan and the nation as a whole during the 1970s. Because

of this decline, there were no doubt fewer opportunities to voluntarily change jobs for teachers who entered the profession after 1972-73.

The cohort variable appears to have an interaction effect with the high school level variable, as shown by the estimated coefficient for the cohort-high school interaction term in our models. In all or our models, we have controlled for cohort effects by including this interaction term plus the cohort variable.

8. Becker, op. cit.

9. Antoni Zabalza, Philip Turnbull, Gareth Williams, The Economics of Teacher Supply, (Cambridge: Cambridge University Press, 1979), p. 114.

10. Joseph R. Antos, Sherwin Rosen, "Discrimination in the Market for Public School Teachers," Journal of Econometrics, Vol. 3, 1975, p. 144.

11. We found that enrollment as correlations of .5 with SES and annual salary increment, while annual salary increment has a .61 correlation with SES level.

12. We used principal components analysis to create the SES composite, which is the first principal component. This component has 68 percent of the four variables' total variance.

13. Since we did not have each district's salary schedule, the three parameters were estimated with ordinary least squares regression using data on salaries, experience, and educational attainment for all teachers in Michigan during 1972-1980. The method for doing this was developed by Steven M. Barro and S. J. Carroll, as described in "Budget Allocation by School Districts: An Analysis of Spending for Teachers and Other Resources," (Santa Monica, CA: Rand Corporation).